The Legacy of the Space Shuttle Program: Scientific and Engineering Accomplishments

Summer 2009 Project at Johnson Space Center
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Abstract:

The goal of this project was to assist in the creation of the appendix for the book being written about the Space Shuttle that is titled *The Legacy of the Space Shuttle Program: Scientific and Engineering Accomplishments.* The specific responsibility of the intern was the creation of the human health and performance (life sciences) and space biology sections of the appendix. This included examining and finalizing the list of flights with life sciences and space biology experiments flown aboard them, researching the experiments performed, synopsizing each experiment into two sentences, and placing the synopses into an appendix template. Overall, approximately 70 flights had their experiments synopsized and a good method for researching and construction of the template was established this summer.

Introduction:

The book titled *The Legacy of the Space Shuttle Program: Scientific and Engineering Accomplishments* is an agency wide initiative lead by a team at the Johnson Space Center (JSC). Wayne Hale is the executive editor of the book, while Dr. Helen Lane is editor-in-chief and the project manager. Dr. Kam Lulla is the co-editor and deputy project manager, with Gail Chapline the other Co-editor and project manager for the engineering portion of the book. Yolanda Harries is the Marshall Space Flight Center (MSFC) engineering lead and Steven Sullivan is the Kennedy Space Center (KSC) engineering lead. The book has an objective release date of January of 2011.

The specific responsibility of the intern was to assist in the creation of the human health and performance (life sciences) and the space biology sections of the appendix for the book. The first task was to examine the list of flights that flew life sciences and space biology experiments

and determine the accuracy of it and expand it where necessary. Flights with extensive information available on them (STS-90, 40, 58, 71, and 78) were the first to be researched in detail, utilizing the book and journal articles written about the flights. Each individual experiment was examined and then the purpose and results of the experiment were synopsized into two sentences. The synopses were then placed into a separate template for each discipline that listed experiments by flight. The formatting of the template and synopses was determined after extensive discussion among the team working on the appendix this summer, which was then established as the desired method for all future work on the appendix. After the initial flights, flights were simply researched in chronological order starting with STS-1 and detailing experiments in both the life sciences and space biology disciplines. The appendix was constructed in a way that will make it easy for future researchers and writers to follow up and edit the work that performed during this summer.

Goals and Purpose:

Overall, *The Legacy of the Space Shuttle Program: Scientific and Engineering Accomplishments* is aimed at the scientific audience, specifically for college graduates with science capabilities, high school science teachers, all kinds of engineers, and all kinds of medical professions. The book is meant to be approximately 700 pages with the guiding principles of being honest, technically correct, and capturing the passion of the NASA Space Shuttle Program team. The main objective of the book is to establish the "so what" factor of the Space Shuttle program. While many Americans are aware of the Space Shuttle Program, most are not familiar with the many scientific contributions that have been made by the program to a large number of disciplines. As such, the book aims to accomplish three major things: inform, empower, and

inspire. First, the book will inform the American scientific community and other readers about the many accomplishments of the program so that learn something new about the Space Shuttle. By learning about the accomplishments of the program, it is hoped that the new knowledge the reader gains from the book will empower them with the results of the various results of the experiments and activities performed aboard the Space Shuttle. Finally, it is hoped that the knowledge will inspire pride in the Space Shuttle program and assure the reader that the nation's investment in the Space Shuttle program has led to major contributions to science and technology.

The appendix for *The Legacy of the Space Shuttle Program: Scientific and Engineering Accomplishments* was the focus of the project this summer. The appendix, in a sentence, is meant to provide accomplishments of the Space Shuttle program by discipline and flight. By providing the accomplishments in such a manner, it is hoped that the appendix can become a valuable reference guide to those interested in the Space Shuttle program. Rather than having to read through a long passage or journal article explaining an experiment, a reader can instead just reference the appendix to obtain a quick two sentence summary of the purpose and result of each individual experiment or activity that was performed on a specific flight. The appendix will have eleven different discipline sections ("payloads" describes both experimental hardware and deployed satellites in the following list): test flights, international payloads, Department of Defense payloads, education experiments and payloads, space science experiments, earth science experiments, microgravity science experiments, human health and performance experiments (life sciences), space biology experiments, commercial payloads, engineering tests, and ISS construction activity.

The goal of the summer was to research and create the human health and performance and space biology sections of the appendix. More importantly, the method used for the creation of the appendix was established. This allows future researchers to simply follow the methods created by the researchers this summer rather than having to figure how to best accomplish the completion of the appendix. Originally, the goal for the summer was to examine ten flights and the experiments associated with those flights, but approximately 70 flights were researched and synopsized by the end of the summer.

Impact of the MUST Internship:

This internship has provided me with many different opportunities to expand my skill set and general knowledge. As a chemistry major, I am used to doing solely scientific style writing and spending an entire summer writing in a journalistic style for the appendix allowed me to become more confident in my writing. I now feel as if I can not only write in basically any style but write well in those styles. The internship also has improved my research skills. When the project was started there was no set way to look for the information required to complete the appendix. This meant that I had to develop a method for researching the experiments which has given me a greater understanding of how to find desired information which will definitely assist me in my future studies in school. Finally, my general knowledge of both NASA and the disciplines of the created appendix has been expanded. Prior to this internship, I had minimal exposure to physiology and biology. Since most experiments in life sciences and space biology pertain to physiology and biology, I have learned a great amount about the two subjects. I have a much greater knowledge of how the human body works and the reaction of it to space travel, in

addition to also learning about the various effects that microgravity has on other biological specimens.

The internship also gave me an opportunity to learn more about NASA itself. I was given the chance to tour many different iconic places: the moon rock lab, the Apollo, Space Shuttle, and ISS mission control rooms, the Neutral Buoyancy Lab, the EVA suit area, and the Space Shuttle mock up that the astronauts use to train for missions. In addition to the tours I had the opportunity to attend lectures by such famous people as Gene Kranz, Chris Kraft, Buzz Aldrin, Neil Armstrong, and others. All of these experiences only increased my passion for space exploration and research and reinforced my desire to continue to work for NASA in the future.

Overall, this internship has made me a more rounded individual, which will allow me to a better job candidate in the future. The mentorship that Dr. Lane and all the others involved in the project has been inspirational and allowed me to better see what is required to become an excellent scientist and member of the scientific work force. I am extremely grateful for the opportunity I had to work on this project and look forward to utilizing the skills I have gained from this internship in the future.